

# SP-600 IDENTIFICATION GUIDE

James A. Moorer

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Most of the information here comes from my own SP-600 restorations (<http://www.jamminpower.com/main/sp600.jsp>) and from the Hammarlund Information web site (<http://www.hammarlund.info/sp600.html>). This will not get you to the exact Hammarlund model, except in a few cases. It will get you to the schematics and documentation for all the standard Hammarlund models.

There appear to be 5 basic “body plans” for the SP-600. Since there were at least 40 different model numbers, several model numbers will share basically the same body plan. To confuse us more, the Signal Corps had not only its own labeling scheme (R-274X), but its own set of serial numbers. There is no record of the correspondence between Hammarlund’s serial numbers and the Signal Corps signal numbers that I have ever seen. To make things more confusing, the Navy commissioned the R-274B which used more than one body plan.

The best I can do in identifying the different models of the SP-600 is to figure out which basic body plan the particular unit is.

The most common model of the SP-600 is the JX-17, the “diversity” receiver. Since this unit is easily recognizable by the cool-looking red knobs, there is no difficulty identifying it. Even if the knobs are missing, it is easily identified by the extra switch on front that selects the AGC time constant. Even if the front panel and all the controls are missing, it is recognizable by the fact that it has 3 (or 4) RF connectors on the back panel. If all else fails, one can peek under the can that houses the 3.5 MHz crystal for the second mixer and see if it has more than one RF choke. That is yet another sign that it is a JX-17. You can see a picture of one here: <http://www.jamminpower.com/eBay/SP-600/SP-600.4.html>

The JX-21A is equally easy to identify, since it has the AM, LSB, USB selector in the bottom right of the front panel.

Generally, the 4 body plans are as follows (in no particular order):

1. The “original” SP-600, including the JX and the JX-1. Has a 6-wire RF deck, R72 and R73 are bleeder resistors, no AGC voltage goes to V6 or V7, and V7 gets a -10V bias.
2. The “direction-finder” SP-600. It has the 6-wire RF deck, R72 and R73 are power resistors that supply the screen voltage for the IF section. The AGC voltage goes to both V6 and V7. E13 is a block that has the “DF/N” screw terminals. This model includes the JX-26 and maybe others.
3. The “7-wire” SP-600. This is a unique model, the JX-14. It has the 7-wire RF desk, R72 and R73 are power resistors that supply the screen voltage for the RF section.

4. An early SP-600. 6-wire RF deck, R72 and R73 are bleeder resistors, not voltage dividers, no AGC voltage goes to V6 (2<sup>nd</sup> mixer) or V7 (gate), and V7 has 0-Volts on the grid bias. This includes the JX-6, and probably others. At least one model of the R-274B has this body plan.

About serial numbers: Hammarlund just numbered the SP-600s consecutively, so there is no clear correspondence between serial number and model number that we know of.

Model numbers tended to follow order numbers. Each time Hammarlund got a contract from the military, they would assign it a new model number. As far as I can tell, many of the model numbers are essentially identical. Similarly, the Signal Corps numbered their units consecutively, even though a particular model (R-274C, for instance) was involved in several contracts, several model numbers, and all sorts of SP-600 serial numbers.

So, with this preparation, here is my suggested identification method (assuming that it is missing the ID plate on the top of the RF deck. It is also possible that somebody switched RF deck top covers on you, which can lead to endless confusion). The following is in the order that I would use, and not in either model number or date of manufacture number.

### **Does it have the 7-wire RF deck? (Body Plan 3)**

Most of the SP-600s have 6 wires going to the RF deck. They are all connected through the circuit board on the top of T1. T1 is located in the little metal shield that is screwed to the right side of the RF unit. It has a cover that is held down by two cap nuts. T1 consists of two tunable inductors, L33 and L34. Sometimes the cover has the designations of the inductors printed on the top. The first step in removing the RF deck is to unsolder the wires from the RF deck. Count the number of wires coming from the RF deck through the square hole behind T1.

If it has a 7-wire RF deck it is an R-274C with a (Signal Corps) serial number of 487 through 1569. This is also known as SP-600JX-14. Note that other R-274C models (JX-7, JX-10, and JX-26) do not have the 7-wire RF deck. You can see pictures of this model here: <http://www.jamminpower.com/eBay/SP-600/SP-600.2.html>. I have personally worked on JX-14s with Hammarlund serial numbers from 8000 to over 10,000.

The schematics of this model (with the 7-wire RF deck) are in Issue-4 of the Hammarlund manual (October, 1952, Figure 13, pp 33-34). Note that Issue-4 has two sets of schematics – the R-274C is in the first set, not in the supplement. It is also shown in Figure 101 of TM11-851.

Curiously, the 7-wire RF deck is shown as Figure 15 (p37) in the Hammarlund SP-600 manuals, Issue-5, Issue-6, and Issue-7, even though the schematics show the direction finder model (the JX-26).

The 7-wire RF deck will also have R72 and R73, which are two large, power resistors, bolted to the side of the chassis near the power transformer. They will be quite obvious. R72 is 7500 ohms at 20 watts. R73 is 10K ohms also at 20 watts. These two divide the

regulated 150 volts down to about 85 volts for the screen supply of the two RF amplifier stages (V1 and V2). Note that other models use R72 and R73 for the screen supply of the IF strip.

Editorial comment: There is some point in regulating the screen supply. If you connect it to the plate supply, there is some chance that it will wave up and down as the plate voltage changes. This makes some feedback into the grid circuit, which does all sorts of nasty things, especially at high frequencies. The RF stages, however, never have much AC voltage on the plates, so there won't be much difference whether you stabilize the screen voltages of the RF stages or not. Other models use R72 and R73 to stabilize the screen voltages of the IF stages, which makes somewhat more sense. The AC (signal) voltage on the last IF stages can be several volts in amplitude. Any feedback into the grid circuitry can drive the circuit unstable. Of course, the IF system operates at a relatively low frequency (455 kHz), so it probably doesn't make much difference there either.

### **Is It Set Up For Direction Finding? (Body Plan 2)**

The terminal strip E13 has several different configurations. The basic configuration is just a linear strip, as was so common in that era. The other configuration is just a bakelite block with studs. There are several different configurations of E13 blocks. The easiest one to identify is the "direction finder" version. This was known as the late versions of the R-274C (Signal Corps serial number 1570 and higher), also as the JX-26 and maybe others. The direction finder version of E13 has two screw terminals on the top and a single wire that may be moved from one to the next. Sometimes, one is identified by the letters "DF". Sometimes the cover to the top of the RF cage has a note on it describing the use of the jumper. As often as not, the cover is either missing or is not appropriate to the receiver it comes with, so you should always check E13.

The schematics of the model with the direction finding modification may be found in Figure 102 of TM11-851, but also in the supplement to Issue-4 of the Hammarlund manual (October, 1952, Figure 13, pp33-34, *second* set). As noted above, Issue-4 has two sets of schematics – this is the second set. Figure 1 shows E13 for the direction-finder version of the R-274C. The schematics for the DF model are also shown in Issue-5, Issue-6 and Issue-7, but you have to be careful since in those manuals, Figure 15 is *not* the RF deck of the DF model(!) – it is the 7-wire RF deck.

Editorial comment: This modification allows the operator to choose the amount of AGC voltage supplied to the 1<sup>st</sup> and 2<sup>nd</sup> RF stages. In the "DF" position, the RF stages are run at a high gain, regardless of the strength of the incoming signal. This has the effect for medium-strength signals of reducing the input noise floor a bit, since the gain of the 1<sup>st</sup> RF stage determines the ultimate noise floor of the receiver. Unfortunately, it also causes increased intermodulation distortion and imaging for stronger stations. For normal, general-purpose listening, the jumper should be set to the "normal" (*i.e.*, *not* DF) setting. Note that even in the normal setting, the AGC supplied to the RF amplifiers is less than some other models.

### **Is it the Early SP-600? (Body Plan 4)**

This one has the 6-wire RF deck, R72 and R73 are bleeder resistors on E16-6, there are no big power resistors over by the power entrance (and power transformer), no AGC voltage goes to V6 and V7, and V7 has 0-volts bias, which means that E17-1 and E17-3 are unconnected, like the 7-wire deck has as well. This is one model of the R-274B and is also called the JX-6. It is also the R-274C, Signal Corps serial numbers 1-486. The schematic for this is shown in TM11-851 as Figure 100. There are pictures of this model here: <http://www.jamminpower.com/eBay/SP-600/SP-600.6.html>.

Editorial comment: I happen to like this model more than all the others. The zero-volt bias on V7 gives a lot of gain on the lower three bands. This is lost on bands 1 and 2, since the atmospheric noise will swamp low-level signals, but on the upper part of band 3, the extra gain can help a bit. It does make a conspicuous difference in the gain between the lower three bands and the higher three bands. All the SP-600s are weaker on the upper bands, but in this one, the difference is even more.

Note that my name for it (“early”) is not strictly true – although the design is early, the pictures at the URL above are for a JX-6 with Hammarlund serial number 15182.

### **Is It The “Original” SP-600? (Body Plan 1)**

You have to identify this one largely by things that are not there. The large, power resistors, R72 and R73 that would be by the power entrance and power transformer will be missing. Instead, there will be two small resistors, R72 and R73, that serve as bleeders for the power supply. They will be found on E16-6. On other models, 16-6 will be void (nothing connected to it). It will have a 6-wire RF deck. If the radio can be powered up, you will find that Pin 1 of V7 (the 6BA6/gate grid pin) will be a constant -11 volts. This is supplied through R-34 (E17-1 to E17-3). It is 100K. On other models, pin 1 of V7 will either be zero, or it will vary as you turn the RF gain. This is the R-274A. The schematics are shown in TM11-851 Figure 99. It is also shown in the Air Force manual AN-16-45-222. It is also shown in the Hammarlund manual Issue-3. It is also shown in Issue-1 and Issue-2, but the labeling of some of the figures is not as complete as in Issue-3. Some pictures of one of these may be found here: <http://www.jamminpower.com/eBay/SP-600/SP-600-3.html>

Note that on the DF model, R53 (10K) goes between E17-1 and E17-3. On the 7-wire RF deck, there is nothing on E17-1 and E17-3.

Note that in the Air Force manual AN-16-45-222, Figure 7-4 shows that the wires going to E13-2 and E13-3 are reversed from in other models(!). This is especially confusing. I ran across one of these – it was a JX (no model number). I believe what happened was that some number of them were made with the colors of the wires coming out of the FCU swapped, so they had to swap them on E13 to make them work. Unfortunately, this means that on E13-2, all the wires are red-white *except* the one from the FCU. Normally,

all the wires on E13-2 are red-white. Note that in Issue-3, the same wires are not shown as swapped.

### **Summary:**

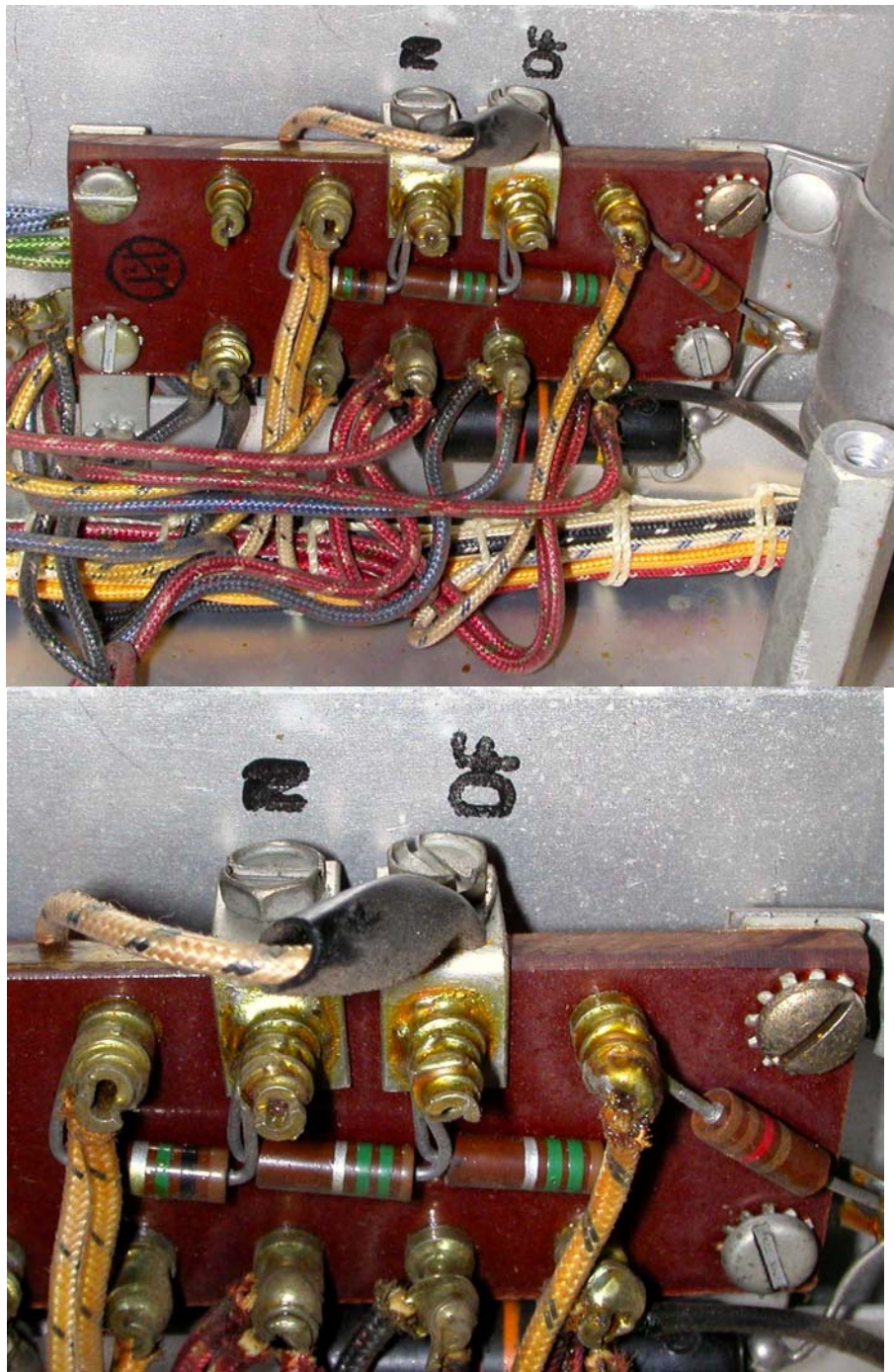
Here is the basic decision matrix as best I can figure it:

	<b>Body Plan 1</b>	<b>Body Plan 2 “DF”</b>	<b>Body Plan 3</b>	<b>Body Plan 4</b>
<b>RF-Deck?</b>	6-Wire	6-Wire	7-Wire	6-Wire
<b>R72/R73 Power?</b>	no	yes	yes	no
<b>E13</b>	Strip	Block, DF/N jumpers	Strip	Strip
<b>E16-6</b>	R72/R73	NC	NC	R72/R73
<b>E17-1, E17-3</b>	R-34(100K)	R-53(10K)	NC	NC
<b>Hammarlund Model</b>	JX, JX-1	JX-26	JX-14	JX-6
<b>Signal Corps Model</b>	R-274A	R-274C, #1570 and up, R-274B (later)	R-274C, #487-1569	R-274B (early), R-274C, #1-486
<b>Hammarlund Manual</b>	Issues-1, 2, and 3	Issue-4, second set, plus Issues 5, 6, and 7	Issue-4, first set	None
<b>Military Manual</b>	TM11-851, Figure 99. AN-16-45-222	TM11-851, Figure 102	TM11-851, Figure 101	TM11-851, Figure 100

If anybody has any other observations, please let me know.

Email: [jamminpower@earthlink.net](mailto:jamminpower@earthlink.net)





**Figure 1 – Terminal strip E13 for the “direction finder” modification to the R-274C. These are found on the JX14 and the JX26. This changes the AGC voltage supplied to the 1<sup>st</sup> and 2<sup>nd</sup> RF stages. In the “DF” position, the first two RF stages are run at a relatively high gain, regardless of the strength of the incoming signal.**

